PN-ABZ-587
92361

Exclusive Breastfeeding Promotion:
A Summary of Findings from EPB's Applied Research Program (1992-1996)

with an introduction by
Chessa Lutter, PhD
EPB's Applied Research Advisor

This activity was supported by the United States Agency for International Development (USAID) under Cooperative Agreement No. DPE-5966-A-00-1045-00 with Wellstart International. The contents of this document do not necessarily reflect the views or policies of USAID.

Table of Contents

Introduction

Exclusive Breastfeeding Promotion: Seven Implications for Programmatic Action

Chessa Lutter, PhD
EPB Applied Research Advisor

Suboptimal infant feeding practices are a major cause of infant and child morbidity and mortality in the developing world. Short durations of exclusive breastfeeding, in particular, contribute to shortened birth intervals due to increased maternal fertility. Although in most countries the majority of women initiate breastfeeding, few exclusively breastfeed for any length of time. The early introduction of breastmilk substitutes, other liquids, and solid foods, as well as the use of artificial nipples and contaminated feeding utensils adversely affect the health of both mothers and infants.

Despite the vast amount of information available in the literature on human lactation and breastfeeding, specific kinds of information necessary to improve the efficacy and efficiency of interventions designed to extend the duration of exclusive breastfeeding are lacking. To address this need for information, Wellstart International's Expanded Promotion of Breastfeeding (EPB) Program initiated an applied research program. Funded through a cooperative agreement with the Office of Health and Nutrition of the U.S. Agency for International Development (USAID), EPB's goal was to provide policy makers and program managers with the information they need to design, execute, and evaluate programs and policies to promote exclusive breastfeeding and other optimal breastfeeding practices in developing countries.

Studies Funded

EPB funded thirteen research projects in eleven developing countries in Africa (Kenya, Lesotho, Malawi, and Uganda), Latin America and the Caribbean (Barbados, Chile, Guatemala, Honduras, Mexico, and Peru), and Asia (the Philippines). Twelve of these studies focused specifically on exclusive breastfeeding, while one focused on extended breastfeeding and malnutrition (Peru).

These projects began in fall of 1993 and have now been completed. Each answers one of the following questions:

- What policies and programs are best suited to extend the duration of exclusive breastfeeding?
- Why do some mothers exclusively breastfeed for the recommended length of time while others do not?
- What constitutes the optimal length of exclusive breastfeeding during infancy?

Seven Implications for Programmatic Action

Seven major implications for programmatic action emerged from the applied research program. Each implication was highlighted in at least two and often multiple studies that used different research techniques and methods. Thus, their relevance for programmatic action is ensured by the varied research methods—qualitative and quantitative research as well as descriptive and intervention studies—that all pointed to the same conclusions.

Implication 1: Focus on the first week and month postpartum

The studies from Kenya, the Philippines, Mexico, and Honduras all showed that the first week and month postpartum were critical periods when mothers are likely to introduce non-breastmilk liquids. If women exclusively or fully breastfed beyond this critical period, they were likely to continue. This was true for both normal and low birthweight infants. Once women passed this critical period, the rate of decline in exclusive breastfeeding slowed dramatically. Thus, programmatic activities need to be targeted to the neonatal period to prevent this early shift from exclusive to partial breastfeeding. Such targeted efforts are cost-effective for two reasons: 1) they target the period when the benefits of exclusive breastfeeding on reducing morbidity and mortality are greatest; and, 2) they are sustainable in that they target the period where the practice of exclusive breastfeeding, if maintained, is likely to be continued.

Implication 2: Focus on specific messages that target key behaviors

Messages tied to specific behaviors will be more effective in promoting exclusive breastfeeding than general messages such as "breast is best." A number of studies showed that women's knowledge of the benefits of breastfeeding and recommended optimal practices is excellent. However, this did not correspond with actual

behaviors. In Kenya, Mexico, and Honduras, for example, women introduced other non-breastmilk liquids and foods in response to specific infant cues. In Kenya and Lesotho, the use of water and sugar and salt solution may be inadvertently encouraged by diarrheal disease control programs. Thus, messages need to target key behaviors that impede optimal infant feeding, such as: use of medicinal water and/and sugar and salt solutions in response to infant crying or stomach discomfort; the use of water to prevent dehydration; or, the early introduction of complementary foods to get infants accustomed to it. Specific messages in response to maternal behavior were particularly effective in Mexico, where the prevalence of exclusive breastfeeding increased after home visits by promotoras who tied their messages to key behaviors they were trying to change.

Implication 3: Focus on families and communities

In all the countries and settings where research was conducted, exclusive breastfeeding is not a cultural norm. Thus, to varying degrees social support and social networks, and the health system are negative influences that must be countered. While the research was mixed with respect to the influence of the health system on exclusive breastfeeding—in Kenya it had a positive effect while in Mexico it had a negative effect—it was very clear with respect to the negative influence of immediate family and neighbors. A number of studies showed that an important source of infant feeding advice was often a woman's immediate family or neighbor. Emphasis must be placed on educating communities—fathers, grandmothers, and neighbors—about the importance of exclusive breastfeeding in general and in the neonatal period in particular (Implication 1). Thus, messages need to be specific not only with respect to key behaviors (Implication 2), but with respect to the target audience. Specific programs need to be developed to educate fathers, grandmothers, and community leaders about the importance of exclusive breastfeeding *and* how they can support women to exclusively breastfeed.

Implication 4: Focus on low birthweight infants

International recommendations to exclusively breastfeed for about six months are relevant to low birthweight (LBW) infants. The study in Honduras showed that LBW infants, while smaller than normal weight infants, did not benefit in weight or length from complementary feeding between four and six months of age as compared to exclusive breastfeeding. LBW, however, is a significant risk factor for not breastfeeding. In the Philippines, LBW tripled the likelihood of not breastfeeding among women who intended to do so. Maternal perception that her infant was "small" also negatively influenced breastfeeding. However, LBW infants who breastfed were

more likely than normal weight infants to fully breastfeed. Because fully breastfed infants weighed more in the first four months as compared to infants with other feeding patterns, good growth performance of these infants may reinforce optimal breastfeeding behaviors. Early intervention, however, is critical (Implication 1).

Implication 5: Focus on employed women

Efforts to extend the duration of exclusive breastfeeding are challenged by maternal employment trends. Although the effect of maternal employment on breastfeeding has been mixed, the effect on exclusive breastfeeding has been consistently negative. The study from Chile clearly shows that programmatic efforts to extend the duration of exclusive breastfeeding among working women can dramatically increase the duration of exclusive breastfeeding. Such programs must include information and advice on the expression and storage of breastmilk, and in some settings, must also address cultural beliefs that work may not be compatible with breastfeeding. For example, in Mexico, women who worked making tortillas expressed the concern that heat from making tortillas was passed to the baby through breastmilk causing diarrhea. To successfully combine employment with exclusive breastfeeding, *time, space, and support* are essential and are themes that should be included in policy and programmatic efforts.

Implication 6: Focus on women's nutrition

Successful promotion of exclusive breastfeeding includes attention to women's health and nutritional needs. Nutrition is a concern to breastfeeding women; exclusive breastfeeding is believed to be more harmful to maternal nutrition than any breastfeeding. In Mexico and Honduras, neighbors discouraged women from exclusive breastfeeding because it would make them "too thin." A study on the effect of full versus partial breastfeeding on maternal nutritional status in Malawi showed that full breastfeeding was negatively associated with maternal nutritional status only when a woman had a low arm circumference near delivery and her infant had a normal rate of growth (about ten percent of women). Thus, for most women exclusive breastfeeding does not negatively influence their nutritional status when compared to partial breastfeeding. To address both biological and perceived consequences of exclusive breastfeeding, programs need to target issues of intra-household food distribution and resource allocation to pregnant and lactating women. For lactating women with infants less than six months, for example, specific messages could focus on how household resources used to prepare complementary liquids and foods (e.g., time, fuel, food, and water) would be better invested in maternal diet.

Implication 7: Focus on integrating breastfeeding promotion into existing health systems

Breastfeeding is a dynamic behavior that continually changes. While, in general, women move from exclusive to partial breastfeeding, the study in Mexico also showed the reverse to occur. In Kenya, women continually adjust their feeding behaviors to infant cues and external messages and influences. Thus, the opportunities to positively influence exclusive breastfeeding behaviors are enormous. Health systems are in a unique position to take advantage of these opportunities as women with young infants frequently have some, often repeated, contact with these systems. In Kenya and Lesotho, the early introduction of sugar and salt solutions appears to be related to efforts by diarrheal disease control programs to prevent dehydration associated with diarrhea. Thus, diarrheal disease programs can play a critical role in encouraging positive breastfeeding behaviors and discouraging negative ones. Likewise, well child visits, as well as health visits for immunizations or contraception can all be used as points of intervention to promote optimal practices.

Structure of this Compendium

An executive summary from each of the studies is included in this compendium. Titles of the final report and other papers resulting from the research are listed with each executive summary. These documents are available from Wellstart International upon request.

What policies and programs are best suited to extend the duration of exclusive breastfeeding?

The Effectiveness of Home-Based Counseling to Promote Exclusive Breastfeeding Among Mexican Mothers

Ardythe L. Morrow, M. Lourdes Guerrero, Juan J. Calva, Robert C. Morrow, Hassan D. Lakkis, Jane Bravo, and Frances D. Butterfoss

Center for Pediatric Research, Children's Hospital of the King's Daughters, Eastern Virginia Medical School, Norfolk, VA
Instituto Nacional de la Nutricion, Salvador Zubiran, Mexico City, Mexico
La Liga de la Leche de Mexico, Mexico City, Mexico

July 1996

Breastfeeding practices in Mexico are far from optimal: 20% of Mexican infants do not initiate breastfeeding and bottle-feeding within the first few months of life is common. To improve breastfeeding practices, a major breastfeeding promotion effort has been undertaken in Mexico over the past few years, focused on the Baby-Friendly Hospital Initiative (BFHI). It is well known that hospital policies and practices have contributed to negative trends in breastfeeding, and that hospital-based breastfeeding promotion is effective in regard to successful initiation of breastfeeding. However, to achieve and sustain exclusive breastfeeding for four to six months postpartum, community initiatives are needed.

Lay peer counseling of mothers by women of the same community is an important strategy that is being used for health and breastfeeding promotion in a number of countries throughout the world. Experience suggests that this is a highly effective method of providing the social and informational support that mothers need for successful breastfeeding. However, there is a lack of research-based data to document the cost-effectiveness of this strategy.

This intervention study examines the effectiveness of home-based counseling by lay peer counselors (promotoras) to increase the practice of exclusive breastfeeding among mothers in San Pedro Martir (SPM), a peri-urban neighborhood of Mexico. We examined two levels of intervention, three home visits and six home visits, compared with a concurrent control group and data from an historical cohort of SPM mothers.

Background

San Pedro Martir is a predominantly low-income, peri-urban area on the southwestern outskirts of Mexico City. The population is approximately 15,000, with

about fifteen births per month identified by census of the community. Medical care is provided to this population by the SPM Clinic, private physicians, and several nearby hospitals. Among mothers residing in SPM, approximately 5% deliver at home, 37% deliver in clinics, and 58% deliver in hospitals.

For nearly fifteen years, research on protective factors in maternal milk has been conducted among mothers and infants in SPM, by a multi-institutional collaboration of Mexican and U.S. scientists. This research has established imortant mechanisms of breastfeeding protection against specific causes of diarrheal disease, but also identified the need for intervention to help improve infant feeding practices in the community. Based on a cohort study conducted from 1988-1991, we found that 95% of SPM mothers initiated breastfeeding, but breastfeeding declined rapidly in the first few months postpartum, and exclusive breastfeeding was rare.

Methods and Results

Ethnographic Study

From June through September 1994, a rapid ethnographic assessment of 150 SPM mothers was conducted to identify cultural beliefs, social influences, and circumstances associated with infant feeding procedures. The results were as follows:

- Strong consensus existed that the most important reasons for choice of infant feeding are good nutrition, growth, and protection against illness—factors also associated with breastfeeding rather than bottle-feeding.

- Seventy-six percent of mothers had encountered one or more problems that caused them to reduce or cease breastfeeding, including negative physician advice, perception of maternal or infant illness, and perception of having bad milk.

- Early supplementation of breastfeeding was common and situation-specific. During infant or maternal illness, many thought breastfeeding should not be practiced. Seventy-two percent agreed that an infant grows best if given a combination of breast and bottle-feeding.

- Physicians were the most important source of advice about infant feeding, followed by family members.

The ethnographic study results suggested strategies which were incorporated into the intervention study: 1) physician education; 2) training promotoras to address

common maternal concerns; and, 3) involving key family members in the educational intervention.

Intervention Study

This randomized, controlled, community intervention study was initiated in March 1995 and continues through September 30, 1996. The study involves two intervention groups and a concurrent control group. In addition, the historical cohort study of 316 mother-infant pairs conducted in SPM from 1988-91 is used as a pre-intervention comparison group. The two prospectively enrolled intervention groups consist of mothers allocated to receive more frequent (MF) and less frequent (LF) home-based counseling by promotoras about exclusive breastfeeding. MF mothers were visited on six occasions: twice during pregnancy, immediately after delivery, and postpartum at weeks two, four, and eight. LF mothers were visited by promotoras on three occasions: at the end of pregnancy, immediately after delivery, and the end of postpartum week two. The major outcome was exclusive breastfeeding to three months of age, meaning that no other liquids or foods were given. Infant feeding practices were examined on the first day postpartum, and at two weeks, four weeks, six weeks, two months, three months, and six months of infant age. Data collection was performed through structured interviews of study mothers conducted by trained experienced staff other than the promotoras.

Physician Education

In April 1995, a seminar for SPM primary care physicians on the benefits and management of breastfeeding, was jointly sponsored by the Instituto Nacional de la Nutricion and La Leche League of Mexico. Of the 80 physicians invited, half attended.

Identification and Training of Promotoras

Three women were hired and trained as promotoras. Each had a high school education and was a respected resident of the SPM community. The promotoras were trained and supervised in lactation counseling and management by La Leche League of Mexico in collaboration with the physician coordinator of the study.

Randomization into Study

To minimize the possibility that intervention households would influence control households, SPM was mapped and divided into 39 clusters of two to four blocks each.

These clusters were randomly allocated to one of the three study groups (thirteen clusters per group).

Enrollment and Follow-up

Study mothers were identified by continuous surveillance of the community. As of July 1, 1996, there were 159 mother-infant pairs enrolled in the study, with 105 followed to at least three months postpartum. Follow-up of these study mothers and infants continues through September 1996. The following summarizes the preliminary findings.

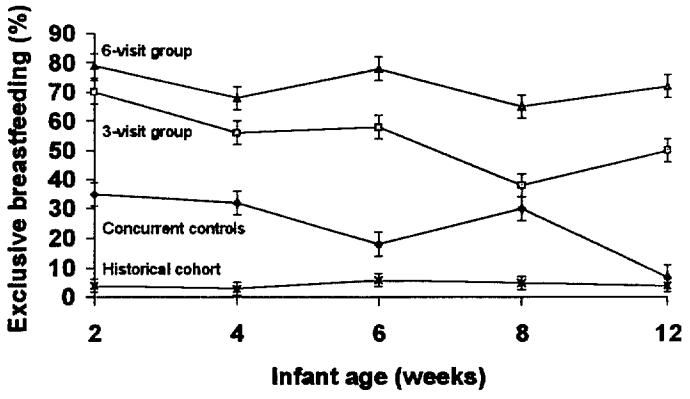
Neonatal Infant Feeding

Thirty-five percent of infants were bottle-fed in the first hours after birth regardless of control or intervention group. Colostrum feeding increased from 17% in the historical cohort to 61% of mothers in the intervention study, a significant secular trend. However, there was no difference in colostrum feeding among concurrent control and intervention groups.

Exclusive Breastfeeding

Among mothers followed to at least three months postpartum, exclusive breastfeeding was maintained from two weeks to three months by one of fifteen (7%) control mothers, thirteen of 40 (33%) mothers who received three home visits, and twelve of 25 (48%) mothers who received six home visits ($p= 0.023$. Fisher's exact). However, many mothers gave supplementary feedings for a short time then returned to exclusive breastfeeding. The percentage of mothers exclusively breastfeeding their infant in the week prior to interview is shown in Figure 1. In the 1988-91 cohort, exclusive breastfeeding in the past week was practiced by only 3% to 6% of mothers. In the current study, 35% of control group mothers exclusively breastfed at two weeks, but this decreased to 7% at three months postpartum. In the three-visit intervention group, exclusive breastfeeding was 70% at two weeks, decreasing to 50% at three months. In the six-visit intervention group, exclusive breastfeeding was 79% at two weeks and 72% at three months. Using a logistic model to account for infant age and group effects, a significant ($p<0.001$) secular increase in exclusive breastfeeding between the historical and concurrent control groups was found. Within the current intervention study, the three-visit and six-visit intervention groups had significantly ($p<0.001$) more exclusive breastfeeding at each time point than the concurrent controls. Further, exclusive breastfeeding was significantly ($p<0.001$) higher in the six-visit group compared with the three-visit group.

Figure 1: Comparison of the percent of mothers exclusively breastfeeding their infants during the past week in intervention and control groups



Conclusions

These preliminary data indicated a dramatic increase in exclusive breastfeeding in the study area. Most of this trend, but possibly not all, is associated with mothers receiving home visits from a trained peer counselor (promotora). Home-based counseling does not appear to have affected infant feeding in the early postnatal period, but is clearly observed in subsequent weeks and months. The fact that exclusive breastfeeding from two weeks to three months was practiced by 7% of control mothers and 33% and 48% of mothers visited by promotoras three times and six times, respectively, demonstrates a significant dose-response effect. The major impediment to even greater success in this community was the negative influence of physician advice.

Programmatic Implications

- Early intervention is critical. In Mexico, infants are given supplementary liquids and foods very early in life, thus, programmatic efforts to increase the duration of exclusive breastfeeding must begin prenatally and in the first week of life.
- Repeated contact is important. This study shows that mothers changed from partial to exclusive breastfeeding following counseling and that the number of contacts was significantly associated with exclusive breastfeeding.
- Home-based peer counseling significantly increases the duration of exclusive breastfeeding.

- The magnitude of increase shown in this project suggests that through the combination of hospital, physician, and mother-to-mother interventions, it is possible to restore exclusive breastfeeding as the social and medical norm in Mexico and elsewhere.

This study was partly funded by a grant from the National Institute of Health (NIH) (HD-13021).

A working paper, entitled "The Effectiveness of Home-based Counseling to Promote Exclusive Breastfeeding Among Mexican Mothers," is available through Wellstart International.

Maternal Employment and Exclusive Breastfeeding in Chile: The Effect of a Breastfeeding Support Program

Veronica Valdes
Catholic University, Santiago, Chile
May 1996

To identify programmatic interventions and gain clinical experience about the factors that enhance employed women's ability to continue to feed their infants exclusively breastmilk after returning to work, a prospective controlled intervention was conducted. The study took place in the hospital and outpatient clinics of the Catholic University in Santiago, Chile, from 1993 to 1995. The population consisted of low and middle class urban women who worked outside of their homes and were separated from their infants during working hours. The intervention consisted of counseling and monthly clinical support during the first six months after delivery.

Selection Criteria

Women from both groups delivered at the maternity ward of the hospital of the Catholic University where they were invited to participate. The selection criteria were as follows:

- Women had to be exclusively breastfeeding at 30 days postpartum and planning to return to work before 120 days;
- Women had to have a telephone where they could be reached; and,
- Women had to plan to receive pediatric care at either the Alameda clinic or CEDIUC outpatient clinic.

Women assigned to the control group planned to to receive pediatric care in Alameda Clinic whereas women assigned to the intervention group planned to receive pediatric care in the CEDIUC Outpatient Clinic. Women were free to choose either clinic for their infants' pediatric care, however, clinic selections were largely the result of geographical preference. Information about the special program of clinical support for working mothers in CEDIUC was not provided to eligible women.

The control group consisted of 116 mother/infant pairs; 146 mother/infant pairs were in the intervention group.

Description of the Intervention

The intervention population was cared for at CEDIUC, in the project's maternal/infant clinic. During the first interview at 30 days postpartum, the women from the intervention group discussed their work and child care plans in a group session. Counseling on how to continue feeding breastmilk after returning to work was given depending on the individual situation. All women were taught hand expression and observed while they hand expressed their milk. Instructions and written material were given on milk expression and storage. Mothers and infants in the intervention group were cared for together at follow-up visits with a pediatrician and a nurse-midwife every month for six months and at twelve months. These visits covered health, growth, and development issues of the infant as well as the mothers' health and fertility. Lactation management and women's concerns and satisfaction with their different roles were also addressed in each visit. Women were encouraged to call or return to the clinic for health or breastfeeding problems. Women from the control group received routine pediatric care at the Alameda Outpatient Clinic and were followed monthly by telephone for six months and at twelve months by a nurse from the research project.

Duration of Exclusive Breastfeeding

Both groups were comparable in age, parity, educational level, gestational age, birth weight, and type of delivery. Over 80% of women from both groups aimed to breastfeed more than six months and over 50% thought it was beneficial for the infant to be exclusively breastfed for six months. The results showed that with routine care and no special support only 6% of women were able to continue to feed there infants with breastmilk only for six months and 33.6% had weaned their infants. In the intervention group, with clinical support and the use of expressed breastmilk, 53.5% of infants were still exclusively breastfed at six months and only 8.2% had been weaned.

Strategies Used to Extend the Duration of Exclusive Breastfeeding

- Returned to work after sixth postpartum month or not at all: control 12%, intervention 12.9%.
- Delayed returning to work until after the end of the postnatal leave: control 7.4%, intervention 12.8%.

- Took the infant to the work place or worked at home: control 5.6%, intervention 6.4%.
- Worked less than 33 hours per week: control 25%, intervention 14.7%.
- Took the infant to a day care center: control 19.4%, intervention 25.7%, and breastfed during working hours: control 57%, intervention 77%.
- Combined the above alternatives with expressing their milk: control 23.1%, intervention 66.2%.

Method Used for Expressing Breastmilk

Among the 90 women of the intervention group who expressed their milk, 69 were using hand expression, 24 hand pumps, and seven used both methods. In the control group, among the 25 women who expressed milk, 22 used hand expression, two used hand pumps, and only one used both methods.

Maternal Satisfaction

When rating the level of effort of accomplishing the role of mother and worker, women from the intervention rated the effort at a lower degree than women in the control group. The level of satisfaction with the experience was rated slightly higher among women in the intervention group. When at six months women were questioned if they would try to feed a next infant with breastmilk only for six months while continuing to work; 84.2% of the control and 100% of the intervention group gave a positive answer on repeating the experience. Similar percentages, 84.2% in the control and 100% in the intervention group said that they would recommend it to a friend.

The factors considered helpful for combining employment and breastfeeding were different for the two groups. Those who did not receive clinical support tended to rely on delaying the return to work, reduction or flexibility of working hours, and having a nearby day care for the infant. A lower percentage of women from the intervention group mentioned delaying returning to work. Women in the intervention group indicated that having a supportive work place and a place where they could express their milk or breastfeed the infant greatly influenced their decision to continue breastfeeding.

Maternal and Infant Illness

The sick leaves requested by women due to their own illness were similar in both groups. When comparing infants exclusively breastmilk-fed versus those partially breastmilk-fed in the intervention group, the relative risk for respiratory infection and diarrhea were 1.9 and 7.8, respectively.

Program and Policy Implications

- Clinic-based breastfeeding support is effective in extending the duration of exclusive breastfeeding among working women.
- Teaching of techniques for breastmilk expression and storage are essential program components.
- Time, space, support, and closeness to the infant are important components of work settings.

A working paper, entitled "Maternal Employment and Exclusive Breastfeeding in Chile: The Effect of a Breastfeeding Support Program," is available through Wellstart International.

Intrapartum Social Support and Exclusive Breastfeeding in Mexico

Ana Langer
The Population Council, Regional Office for Latin America and the Caribbean

Lourdes Campero and Cecilia Garcia
Center for Research on Population Health, National Institute of Public Health, Mexico

Sofia Reynoso
Department of Reproductive Health, Ministry of Health, Mexico

July 1996

In Mexico, care provided to women during pregnancy, childbirth and the period following childbirth has become increasingly medicalized during the last decade. In effect, care is provided exclusively by the doctor and nurse, both of whom consider that labor and childbirth may well result in a pathological condition in which the mother and/or child requires specialized and technological attention if it is to be successfully cured. This care model has undoubtedly contributed to the reduction in the death rate for women in Mexico in recent decades, and to fewer perinatal diseases and deaths. However, it has deprived the women of the support they traditionally received from the midwife, their families, and women in the community, and it has dehumanized the childbirth experience to the point that it has become a mechanical and intimidating process.

In short, the pregnant woman is alone, in an unknown and frightening situation and being attended to by overworked hospital staff who, consequently, have little patience with and are not receptive to her needs. The fear, anxiety, and pain resulting from this situation contribute to increased medical interventions.

Study Objective

The purpose of the project was to design, implement, and evaluate an intervention consisting of psychosocial support during labor, childbirth, and the immediate postpartum period to improve the health of the mother and the child and increase the duration of exclusive breastfeeding. The intervention consisted of giving a woman who is having her first baby the continuous physical and emotional support of another woman who is exclusively dedicated to this task (a "doula") during labor and childbirth. This type of assistance was meant to improve the conditions in which labor takes

place; to make mothers feel better and increase their participation in the birth and, consequently, to reduce the need for medical intervention during childbirth. Furthermore, it was hoped to promote mother-child bonding and make breastfeeding easier.

Intervention

The intervention was evaluated by means of a randomized clinical trial, an ethnographic qualitative study, and a study of the program's cost-effectiveness. The last mentioned is considered to be an essential element in proposing recommendations about the decisions that health authorities should make. Studies in Guatemala, the United States, and South Africa on the participation of doulas have shown positive effects: a reduction of the use of anesthesia and analgesics during labor, in the number of cesarean sections, the use of forceps, and in the length of labor. Similarly, the studies demonstrated that companion support during labor speeded up the mother's recovery, helped mother-child bonding, and reduced anxiety and depression in the first six weeks postpartum. It was also found that psychosocial support during labor had a positive effect on the start and continuation of breastfeeding. The effect on exclusive breastfeeding, however, was unknown.

The *evaluation* of the program was threefold: the effects on the health of the mother and child were measured by means of a randomized clinical trial; cost-effectiveness was measured by a health economics study; and, finally, women's perceptions and satisfaction were assessed by a qualitative study, as well as the health services personnel's viewpoints about the program.

The *program* consisted of continuous support provided by the doula to the mother during labor and delivery, with the following components: emotional support, information, physical support, communication, and immediate contact between mother and child. The experiment continued in the period immediately after birth when the doula visited the mother in the maternity ward. During this visit, the doula told the mother about the benefits of exclusive breastfeeding and how to solve breastfeeding problems she might encounter.

The *evaluation* was to measure the effects of the intervention on medical activities and procedures during labor and childbirth, the health of the mother and of the newborn, the emotional state of the mother, breastfeeding, and the health of the baby and prevalence of exclusive breastfeeding a month after birth. The evaluation was made through home visits community breastfeeding promoters blinded to the treatment group to which the mother had been assigned.

Sample

A total of 724 women were recruited, 363 (50.1%) for the control group and 361 (49.9%) for the intervention group. There was an attrition rate of 9.5%, with no significant differences between the intervention and control groups. The randomization process was efficient and it produced two homogenous groups as to their socio-economic level, reproductive history, and emotional state upon entry.

Effect on Labor and Delivery

In comparing incidence of cesarean ection, epidural anesthesia, and use of forceps in the control and intervention groups, no statistically significant differences were found, although a tendency was confirmed towards more medical and surgical interventions in the control group. These results show that, unlike previous studies, the intervention did not change rigid institutional practices that have little relation to the peculiarities of the women and their labor. A clear significant statistical difference appears in the length of labor (3.83 hours in the intervention group and 4.8 hours in the control group).

There were no differences between intervention and control groups regarding neonatal conditions or maternal reports of pain or anxiety. However, in relation to women's emotional conditions, those in the intervention group had a much greater control over their experience than their counterparts in the control group.

Effect on Infant Feeding Patterns

Only 9% of the total sample began breastfeeding in the hours immediately following birth and the intervention did not alter institutional norms that delay initiation of breastfeeding. However, the prevalence of exclusive breastfeeding at one month was significantly higher in the intervention group (12% versus 7%). Feeding on demand was most common in both groups. All behavior recommended to promote breastfeeding (care of the nipples, hygiene, etc.) was significantly better in the intervention group and illustrates the positive effect of the talk on breastfeeding given in the hospital by the doula.

Reasons for supplementation and/or weaning included problems with nipples, return to work, maternal or infant sickness, perception by the mother that "there was not enough milk" or "the baby did not like it," a recommendation by some family member or by the doctor, etc. There were significant differences in favor of the intervention group in respect of "the doctor's advice," "the milk dried up," and "the mother was

hospitalized." These differences seem to imply that the women in the control group supplemented their milk with formula because of reasons based on popular beliefs about breastfeeding, or because they had been given recommendations by doctors who, unfortunately, too often and with little foundation, recommended a supplement. The women in the intervention group appear to have been better prepared to ignore this advice; they only added a supplement when health problems arose. The cost-effectiveness analysis showed that, despite the limited overall effect of the intervention, it was still cost-effective as compared to routine care.

Programmatic Implications

The characteristics of the hospital and of the women admitted to it are those which best explain the limited effects of our study on medical interventions. However, positive effects on the emotional state of the mothers, length of labor, and duration of exclusive breastfeeding were found. Use of doulas is cost-effective and can be recommended to those responsible for clinical services. To increase their cost-effectiveness, consideration should be given to applying the program in hospital units with less inclination towards medical interventions.

A working paper, entitled "Intrapartum Social Support and Exclusive Breastfeeding in Mexico," is available through Wellstart International.

Time Allocation and Infant Feeding Pattern: Women's Work in the Informal Sector in Kampala, Uganda

Paula Davis
Johns Hopkins University, Baltimore, MD
May 1996

Research Objectives

The primary objective of this study was to examine the relationship between women's market work in Kampala and breastfeeding patterns. Within an economic model of breastfeeding, as described below, the value of women's time is presumed to be the determining factor in decisions about infant feeding. Therefore, an observational study of women's time allocation to income-generating projects, breastfeeding, domestic chores, and other activities would elucidate and clarify the impact of women's work on breastfeeding.

Specifically, this research addresses the following questions:

- Is there a direct trade-off of mothers' time spent in breastfeeding for time spent in income-generating activities?
- Do mothers engaging in a specific type of income-generating activity spend more time in breastfeeding?
- Does the household structure affect the proportion of time a woman spends breastfeeding and in economic production?

Study Design and Methodology

A time allocation study of women's activities was conducted among market women in Kampala, Uganda. Ninety-two pregnant women were selected from nine types of informal-sector work: tailoring, second-hand clothes sellers, vegetable vendors, cooked food/tea sellers, general goods sellers, beer brewers, newspaper sellers, hairstylists, and dry rations vendors.

All women were expecting to deliver their infants within a two-month period. Throughout the nine-month study, mothers were visited every two weeks and observed for three hours.

Analysis

Proportions of time in each of nine activities was computed for each respondent based on the minutes observed in a particular activity out of the total number of minutes observed. Univariate and bivariate statistical analysis is reported for two categories of baby's age based on the infant's age at the time of each visit. The notation "All Ages" refers to the full data set, while "Less Than Four Months" refers to a data file that includes information on mothers whose infants are under four months of age.

Summary of Findings

Mothers working in the informal-sector in Kampala do spend a large proportion of their time breastfeeding their infants. The proportion of time (out of a fourteen-hour day) spent breastfeeding was 3.71 for all ages of the baby, and 5.36 for mothers whose infants were under four months of age. Younger mothers spent more time breastfeeding than older mothers for both categories of the baby's age. Mothers whose infants were under four months of age at the time of the observational visit spent more time breastfeeding than mothers of all ages of infants.

The mothers in this study spent negligible amounts of time feeding the baby foods or liquids besides breastmilk. This may be explained by the fact that helpers are the ones giving such supplements to the baby when the mother decides the baby should have them. It is possible that the presence of a helper in a household simply facilitates supplementation rather than enhances the proportion of time a mother spends breastfeeding.

Mothers spent a remarkable proportion of their time in their businesses. Overall, women spent 23.35% of their time in activities related to their business out of a fourteen-hour day. About 8.7% of the time at a mother's place of work was spent on breastfeeding or infant care. This challenges the assumption that market work does not interfere with breastfeeding since mothers may bring their infants with them to their workplaces. Markets are owned and operated by the Kampala City Council, and there are specific rules that do not allow infants in the market place because of sanitation problems and for the safety of the infant. However, a significant number of women do bring their infants to work with them anyway. Most market workers do not go home for lunch, as transportation costs preclude making another trip home each day. For these reasons, encouraging mothers to return home at lunchtime to breastfeed is not a viable option.

Over three categories of breastfeeding—high, medium, and low—there was a significant difference in the proportions of time women spent in their businesses. Low breastfeeding is associated with higher proportions of time spent in business activities; similarly, high breastfeeding is associated with lower proportions of time in business. These differences were found for both categories of baby's age.

Over three categories of business activity—high, medium, and low—the differences in proportions of time women spent breastfeeding were not significantly different. Mothers' domestic responsibilities were different over the three levels of business activity, such that high activity was significantly associated with lower proportions in domestic chores. This suggests that domestic chores may present more of a constraint on women's time available for their businesses than does breastfeeding.

Mothers in various occupations had different proportions of time spent breastfeeding. Vegetable vendors had the greatest proportion of breastfeeding time, although they had the second highest proportion of time in business activities. Tailors had the lowest proportion of time spent breastfeeding but had the greatest proportion of time in business; their time spent in business activities is about twice that of any other occupation. Mothers in most occupations showed a decrease in the proportion of time in business while the infant was under four months of age. For most of the occupations compared, mothers with infants under four months of age showed a decrease in the proportion of time in family activities. Most mothers showed an increase in the proportion of time they were spending in domestic chores while the infant was under four months of age.

The presence of a helper in the household had no significant impact on the proportions of time mothers spent either breastfeeding or in business activities.

Program and Policy Recommendations

Most of the recommendations from this study have to do with conditions at the workplace and changes that would promote exclusive breastfeeding among market women.

Although none of the markets allowed infants to accompany their mothers, few were very stringent in their enforcement of this rule. Given that many mothers brought their infants to the workplace, and because the majority of market vendors are women, infant care arrangements present a problem to the market as a whole.

Several problems and possible improvements that could be made in the market facilities to alleviate these problems are as follows:

- None of the markets has a water source on the grounds. Water is brought in containers, usually by each worker. Provision of a source of water for the market that is accessible to all vendors would alleviate some of the sanitation problems associated with the infants.

- Only one woman in this study went home to breastfeed her baby during the day, and usually she did not return to her workplace afterwards. She simply missed the afternoon's business. This is not a viable option for most women in informal sector work since the transportation costs are untenable; many women actually walk to and from work, which can take over an hour and is only imaginable in morning and evening, not in the heat of the middle of the day. Two solutions to this problem became evident as various market places were observed:

  1) A day care center on site. One market had previously established a "day-care" center for infants that was run by young women who were trained and licensed to perform nursery care. Mothers paid a daily fee to use the center. All mothers were required to breastfeed to use the facility; if a mother did not come a minimum number of times per day to breastfeed she could no longer leave her baby there. While this particular market was smaller than the ones included in this study, a similar arrangement for other markets would seem appropriate.

  2) Informal day care with a friend at a cleaner work station. An informal arrangement that was observed might be possible on a large scale, especially within the bigger markets. A woman working in the old clothes section, in a stall that is less crowded and cleaner than many stalls in other sections, allowed a friend (a tailor) to leave her infant there during the day. The mother of the infant came periodically to check on the baby and to breastfeed; moreover, she could be easily notified if the baby became ill. Women who have safer and cleaner working areas might allow one mother from a more dangerous worksite to leave her infant so that the baby is nearer to its mother during the workday.

A working paper, entitled "Time Allocation and Infant Feeding Pattern: Women's Work in the Informal Sector in Kampala, Uganda," is available through Wellstart International.

Why do some mothers exclusively breastfeed for the recommended length of time while others do not?

Early Complementary Feeding: The Role of Social Support Networks

Altrena G. Mukuria, Margaret Bentley, Wambui Kogi-Makau, Laura Caulfield, and Karen Bandeen-Roche

Johns Hopkins University, Baltimore, MD

June 1996

Introduction

In Nairobi, Kenya, although breastfeeding initiation is nearly universal, the majority of mothers offer some type of non-breastmilk liquid within the first month. Early complementary feeding is so widespread that it appears to be a normative behavior. Previous research on infant feeding practices in Kenya do not explain why early complementary feeding is so pervasive across ethnicity, age, marital status, and work status. Breastfeeding practices not only reflect an individual decision but constitute a social behavior that is influenced by the norms and expectations communicated by an individual's social networks. Correspondingly, social support and social networks have been positively associated with breastfeeding. However, the role of social support in exclusive breastfeeding versus partial breastfeeding has not been studied.

Study Objectives

The overall objectives of the study were to understand the socio-cultural context in which infant feeding decisions were made and to identify factors that influence the decision-making process. Specific objectives of the study were three-fold:

1. To describe infant feeding practices and identify factors influencing the duration of exclusive breastfeeding during the first four months of life.

2. To describe the structure of social networks and their support for infant feeding practices.

3. To provide information for the design of a community-based intervention to prolong the duration of exclusive breastfeeding.

Methods

The study was conducted in Kangemi, Nairobi between June 1993 and July 1995. Using both qualitative and quantitative research methods the study had three phases. Phase I included an ethnography of infant feeding and social support. The purpose of the ethnography was to provide a rich and detailed description of the cultural context of breastfeeding in the study setting. This phase consisted of structured and un-structured qualitative methods. The qualitative data were used to develop the formal survey instruments for Phase II and to provide interpretation of the quantitative results.

Phase II included a five-month, prospective study of 211 mother-infant pairs from 36 weeks gestation through four months post-partum. This phase consisted of bi-monthly, home interviews with mothers who were asked about utilization of health services, exposure to advertisements, promotions and other sources of information. Data was also collected on the mothers' participation in social activities and maternal and infant morbidity status. In addition, a 24-hour dietary recall, one week frequency recall of foods and fluids given infants and reasons mothers gave their infants additional fluids and/or foods were requested. Social support information was collected on seventeen specific social support actions, characteristics of network members who performed the actions, and the mother's satisfaction with the social support she did or did not receive.

Phase III consisted of case studies of thirteen women, seven who fully breastfed (three exclusively) their infants for at least two months and six mothers who started complementary feeding before two months.

Results

Breastfeeding Knowledge

Mothers' knowledge of exclusive breastfeeding is generally high. Eighty-three percent of mothers reported prenatally that an infant could remain healthy by exclusively breastfeeding for three months. Mothers reported that water should be introduced at a median of five months of age and solids at a median of three to four months. Prenatally, 85% of mother's said they planned to give their infants colostrum. In the focus groups, a mother said, "the baby will get strength from it."

Breastfeeding Practices

Maternity practices were supportive of breastfeeding initiation. One hundred percent of the study mothers initiated breastfeeding, 56% of mothers reported that they put their babies to the breast within half an hour after delivery. While in hospital, 71% of mothers and infants roomed-in together. Virtually all mothers reported breastfeeding on demand. Only 11% reported giving a prelacteal feed, and 93% of mothers gave their infants colostrum.

Despite high breastfeeding knowledge, few mothers exclusively breastfeed. Two main infant feeding groups emerged: those who breastfeed 'almost exclusively;' and, those who 'partially breastfeed.' The almost exclusive category includes those who gave their infants water, salt sugar solution (SSS), gripe water and other medicinal waters. These mothers viewed themselves as exclusively breastfeeding since they were not giving other milks or foods to their infants. The partial breastfeeding category includes those who gave their infants milks and other soft/mashed foods.

Mothers quickly switched from the categories of 'exclusive breastfeeding' and 'almost exclusive' to complementing breastmilk with added milks, fluids and foods over the four month follow-up period. There appears to be three critical time periods when mothers who initially exclusively breastfed began to introduce fluids and foods: two weeks, six weeks, and three months. At birth, almost 90% of women are exclusively breastfeeding. At two weeks it drops to 46% exclusively breastfeeding and at one month it drops again to 25%. From six weeks through three months there was a much slower rate of shifting away from exclusive breastfeeding. By four months, over 90% of the infants were receiving other non-breastmilk feeds.

What do mothers feed their infants in addition to breastmilk? The fluids and foods that mothers gave their infants changed over time. At two weeks, 53% of babies were given medicinal waters including salt sugar solution (SSS) (46%), water (30%), glucose water (24%), and gripe water (24%). Eleven percent (11%) received milk and 3% orange juice. At six weeks this pattern continued. By three months, however, a larger percentage of milks (33%) and orange juice (24%) were given along with potatoes (26%), papaya (20%) and cooked ripe bananas (19%). By four months, 56% of infants who received other non-breastmilk feeds were given milk and 41% were given orange juice along with water (46%) and SSS (39%). Thirty one percent of the babies were fed potatoes, 20% each were given papaya and avocado and 18% were given mashed raw bananas.

Breastfeeding Beliefs

Mothers were asked why they gave their infants foods and fluids. The main reasons were that 'the baby was growing teeth,' 'had stomach aches,' 'was crying,' 'was hungry,' that the 'mother's milk was not enough' and 'to get the baby used to food.' Reasons varied with the age of the infant. In the first two weeks, 17% of mothers indicated that the baby was growing teeth and 12% of mothers replied that the baby cried. Stomach aches were also important. At six weeks, 16% said that the baby was growing teeth and an equal percentage said that the baby cried. At three months, two other reasons were predominant, that 'the baby was hungry' (21%) and 'the mother's milk was not enough' (15%). By four months, 'getting the baby used to food' (17%) was the third most frequently given reason in addition to 'the baby was hungry' and 'the mother's milk was not enough.' In general, mothers were basically responding to the baby's crying cues after breastfeeding.

Social Support

The quantity of social support was hypothesized to be related to breastfeeding. A large quantity of positive social support was expected to be associated with exclusive breastfeeding. The quantity of social support was measured as the number of social support actions mothers received. The median number of actions were ten in each time interval. In contrast to our hypothesis, we found that low social support (less than ten actions) was associated with full breastfeeding.

Social support and breastfeeding (defined as full and partial) were examined at the three critical time intervals: two weeks, six weeks and three months. At two weeks, negative feedback (being told the baby was not growing well and that the baby was not getting enough to eat) were related to partial breastfeeding. Also 'having someone feed the baby' for the mother (a negative physical support) was found in 38% of those who partially breastfed but only 5% of those who fully breastfed. At six weeks, 'receiving guidance/advice,' 'talking about private feelings,' 'being told the baby was crying too much,' 'having someone to take care of the baby' and 'having someone feed the baby' were all associated with partial breastfeeding. All of the social support actions associated with partial breastfeeding at six weeks were also present at three months. Positive feedback, i.e. 'being told the baby is growing well,' which was expected to be supportive of exclusive breastfeeding was also statistically significant at three months. Again contrary to the hypothesis, the relationship was associated with partial breastfeeding and not full breastfeeding.

Social Networks

The ethnographic findings also gave insights into the structure of social networks (defined as the individual(s) who provided social support) for infant feeding. We identified fifteen types of social network members that included husband, immediate family members, in-laws, other relatives, friends, neighbors, health and community workers, and church and women's group members. For each of the relevant social support actions, we found the networks to be 'narrow' (few different types of members). Only three or four network members were most frequently mentioned. Looking across time intervals, the network included the husband, neighbors, immediate family members or in-laws and/or friends. Husbands and neighbors were most frequently mentioned as the individuals to have provided guidance and advice about child care. Husbands and friends were most frequently mentioned as being the person a mother talked with about her private feelings. Neighbors were by far the most frequently mentioned as telling the mother the baby was crying too much. Husbands and neighbors were the most likely to have given food to the mother for the baby. Neighbors, husbands, and immediate relatives were the most frequently reported to have taken care of the baby. Feeding the baby (which is synonymous with partial breastfeeding) was done by husbands, neighbors, immediate relatives, and by three months also friends. These small networks of kin and neighbors are indicative of 'closed' networks. Closed networks typically provide little contact with outside influences and exposures to other sources of information.

Conclusions

Despite adequate knowledge of exclusive breastfeeding practices as promoted by health authorities, decisions related to infant feeding appear to be a result of a process in which a mother monitors her infant's behavior and adjusts her feeding style over time. Mothers felt that their infants were teething or experiencing stomach ailments in the early weeks and gave medicinal waters. These actions were promoted by the social support networks of mothers, reinforcing normative breastfeeding behaviors. Social support includes guidance/advice and positive and negative feedback and direct actions such as giving foods for the baby or feeding or taking care of the baby for the mother. In the early months, mothers received advice and guidance on how to handle perceived minor stomach ailments and teething problems. Negative feedback such as being told that the baby was not growing well and that the baby was not getting enough to eat influenced the mothers actions and encouraged early complementary feeding with milks and soft foods.

Implications for Policy and Program Interventions

- Long-term policy and program interventions should be directed at changing norms of early complementary feeding. Key opinion leaders outside of the health system should be involved in promoting exclusive breastfeeding in the first six months of life.

- Focus of interventions should be on encouraging the initiation of exclusive breastfeeding and preventing switching at two weeks, six weeks, and three months by targeting certain behaviors. In conjunction with the Control of Diarrheal Diseases Program, mothers should be discouraged from giving SSS and other medicinal waters.

- Messages should encourage mothers, particularly at two weeks, six weeks and three months, by reminding them that they have adequate breastmilk to feed their infants and discourage the introduction of medicinal waters and other non-breastmilk milks and foods. A baby does not need to get used to foods before six months. During clinic visits for immunizations, mothers could be encouraged to continue exclusive breastfeeding and to not give complementary waters, milks, and foods.

- Health communication programs need to target women who advise mothers and not just breastfeeding mothers. Messages such as 'breast is best' and 'exclusively breastfeed for four to six months' are too vague. Messages tied to specific behaviors (such as the use of SSS and other medicinal waters and responses to crying after breastfeeding) would better address early complementary feeding in this community.

- Men and how they can support exclusive breastfeeding should also be specifically targeted by programmatic efforts.

A working paper, entitled "Early Complementary Feeding: The Role of Social Support Networks," is available through Wellstart International.

A Breastfeeding Culture Without Exclusive Breastfeeding in Lesotho

Michael Latham and Stina Almroth
Cornell University, Ithaca, NY
June 1996

This research in Lesotho was designed to determine the influences on exclusive breastfeeding in order to guide future interventions, and to assess the adequacy of the rapid assessment procedures (RAP) used for this purpose. Data were gathered during two phases of field work in three geographically different locations. During the first phase – the rapid assessment phase – information was obtained through focus groups and individual interviews. During the second phase, another round of focus groups and individual interviews was supplemented with a clinic-based questionnaire survey. The main categories of respondents interviewed during both phases were mothers, grandmothers, and nurses.

Exclusive Breastfeeding is Not a Cultural Norm

We found that the breastfeeding culture, which ensured that most infants were breastfed, did not include exclusive breastfeeding. The grandmothers had given gruel, but only occasionally, and may thus have been closer to exclusive breastfeeding than today's mothers who gave supplements of water routinely. This water could be plain, but more commonly contained sugar, and frequently also salt. Mothers said they were giving these different types of water to prevent and counteract constipation, as a supplement or replacement for other feeds, in between breastfeeds, and because they believed the body needed water. These were also the reasons nurses gave for recommending water.

Mothers frequently mentioned nurses as their source of advice for giving water, and the grandmothers indicated that the nurses were responsible for having introduced the practice of giving water to young infants. The grandmothers claimed that they had not given water to their infants and that water supplementation was a new practice.

Oral Rehydration Therapy and Exclusive Breastfeeding: Mixed Messages?

Water with sugar and salt was commonly used as an everyday supplement for healthy infants. A number of respondents associated this practice with the promotion of oral rehydration therapy. Thus, the diarrheal disease control program which should

have promoted exclusive breastfeeding may in effect have been discouraging it by encouraging early supplementation. Compared to the home-prepared sugar-salt solution given during diarrhea, the fluid used as an every-day supplement for healthy infants was said to be a more dilute solution, and the composition was less critical.

At the time of our study, exclusive breastfeeding for four to six months was a recent recommendation. Few nurses were aware that water for infants was not only unnecessary but might even be harmful. Since nurses believed as strongly as mothers that water supplementation for infants is beneficial, efforts to discourage this practice and promote exclusive breastfeeding must clearly take into account the beliefs and practices of both groups.

Adequacy of Rapid Assessment Procedures for Program and Policy Development

The rapidity and adequacy of the rapid assessment procedures (RAP) used in this study were examined by comparing the quality and the quantity of the data obtained during the initial six-week rapid assessment phase to what was achieved by subsequent formal analysis and additional data collection. While analysis and data collection after this initial phase provided some additional insight, it was consistent with our first impressions. Thus, we found that RAP can be rapid and provide information which is adequate to inform programs and policy. We attribute this achievement to focused research topics and data gathering, effective purposive sampling, and a research team with the requisite skills and experience.

Programmatic and Policy Implications

- Water supplementation appears to be a clinic-introduced practice in Lesotho. The promotion of oral rehydration therapy has spurred mothers to give water with sugar and salt even to health young infants. Breastfeeding promotion needs to be integrated with diarrheal disease control programs to ensure coordination of efforts.

- Water supplementation is an obstacle to achieving the goal of exclusive breastfeeding in Lesotho. While removing this obstacle seems desirable, it is less clear what the best approach would be. Clearly, the beliefs of both mothers and health providers need to be considered.

- A six-week study using rapid assessment procedures (RAP) can provide relevant information for program and policy modification and development.

A working paper, entitled "A Breastfeeding Culture Without Exclusive Breastfeeding in Lesotho," is available through Wellstart International.

Extended Breastfeeding and Malnutrition: An Example of Reverse Causality

Grace S. Marquis and Kathleen M. Rasmussen
Cornell University, Ithaca, NY
April 1996

Introduction

Although it is accepted that breastfeeding improves the health and nutritional status of infants, some researchers have found increased prevalences of malnutrition among children continuing to breastfeed into their second year of life. This study, which used quantitative and qualitative research methods, was undertaken to determine the following: 1) if there is an association between breastfeeding and linear growth in Peruvian toddlers; 2) how is this association varied by toddlers' dietary and health conditions; and, 3) how is child health influencing Peruvian mothers' child-feeding decisions.

The Association Between Breastfeeding and Linear Growth

To examine the role of breastfeeding in toddlers' health, breastfeeding duration was determined from two comparable cross-sectional studies conducted in a low-income community in Lima, Peru in 1986 and 1993. Overall median breastfeeding duration increased from nineteen months in 1986 to 22 months in 1993. The breastfeeding duration for women who breastfed for at least one year increased by three months (22.5 to 25.5 mo; $p<0.02$) over the seven-year period. Increased breastfeeding duration appeared to be a response to the severe economic crisis and may also reflect intensive breastfeeding campaigns by the public and private health sectors.

The association between breastfeeding and linear growth was determined separately for each quarter of the second year of life. Emphasis of this project was placed on the first quarter, twelve to fifteen months of age, as this is a pivotal period in child health. During this period, human milk intake decreases while the increase in complementary foods is inadequate to meet energy and nutrient needs. In this study, prevalence of stunting showed the steepest increase (almost 15%) during the first quarter as compared to the other three quarters.

Linear regression analysis was used to predict length at fifteen months. Explanatory variables of fifteen-month length included twelve-month length, time between length measurements, twelve- to 14.9-month breastfeeding frequency, complementary food intake, and incidence of diarrhea. With twelve-month length in the equation, other variables reflected their effect on twelve- to fifteen-month length gain. When twelve-month length and the interval between twelve- and fifteen-month measurements were controlled, the level of incidence of diarrhea and complementary food intake modified the relationship between breastfeeding and linear growth. When toddlers' complementary food intake was high or when intake was low and incidence of diarrhea was also low, there was no association between breastfeeding frequency and linear growth. Only in the worst health situation, when children's complementary food intake was low and they also had high incidence of diarrhea, was increased breastfeeding frequency associated with decreased fifteen-month length, implying that breastfeeding was harmful for growth.

Toddlers' Dietary and Health Conditions Influence Weaning Decisions

One explanation for these negative results is that the association reflects reverse causality. That is, increased breastfeeding did not cause poor growth; instead, those toddlers growing poorly were not weaned. If this were the case, one would see an increased rate of malnutrition in breastfed children and a lowered risk of being weaned in those growing poorly. To determine if this negative association reflected reverse causality, logistic regression was used to predict weaning by 14.9 months by twelve-month weight-for-age, nine- to 11.9-month complementary food intake, and change in morbidity between nine and fifteen months. There was a significant decrease in probability of weaning with increased morbidity only when weight-for-age and food intake were low. This suggests that the negative relationship between breastfeeding and growth reflected the fact that mothers postponed weaning when the child's health was poor. These conclusions support the hypothesis that the negative association reflects reverse causality.

Results from in-depth interviews with 36 mothers conducted in 1993-1994 supported the conclusions from the logistic regression. Four areas of influence on the decision to wean (maternal well-being, child health, time obligations, and breastmilk quality) were identified. Mothers perceived weaning to be associated with increased illness and delayed or reversed motor and language development in the child. As a result, children in poor health were not weaned. Continued breastfeeding after twelve months, however, was reported to increase maternal weight loss and back pain. The results suggest that the decision to wean was primarily based on perceived maternal health; yet, mothers often delayed weaning until a time when they believed

its negative effects on child health and development would be minimized. These results support the conclusion from the logistic regression analysis that a viable explanation for the negative association between breastfeeding and linear growth is that mothers' perception of their children's health influenced the timing of weaning. Thus, it is not breastfeeding that leads to poor growth. Rather, children who were ill with diarrhea and were also poor eaters were less likely to be weaned.

Finally, additional analyses were carried out to determine the association of breastfeeding with linear growth when the diet was of poor quality. To examine the association between breastfeeding and linear growth without the problem of reverse causality, the group of children for whom there was a negative association between breastfeeding and linear growth were excluded. Multivariate linear regression was used to predict fifteen-month length by twelve-month length, time between twelve- and fifteen-month measurements, breastfeeding frequency, diarrheal illness, and intakes of complementary food and animal protein. The relationship of breastfeeding with linear growth was modified by the animal protein foods consumed. Increased breastfeeding was positively associated with linear growth when animal protein intake was low, suggesting that total protein or micronutrient intake was inadequate. Increased linear growth was also associated with increased protein intake when total complementary food intake was low. This analysis demonstrates the importance of human milk as a source of nutrients when the quality of the diet is poor.

Conclusion

In summary, the negative association noted between breastfeeding and growth in children with poor dietary and health conditions can be explained as follows: mothers evaluated children's nutritional status, health, and dietary intakes and continued to breastfeed those children in the poorest condition. As a result, there appears to be an increase in the proportion of malnourished children in the breastfed group because healthy children were weaned earlier. Inasmuch as mothers recognized weaning as traumatic for the child, interventions should emphasize maternal health during lactation, which—if adequately maintained—will support continued breastfeeding in the second year of life. Breastfeeding in this community continues to have an important positive role in child health after the first year of life and should be promoted.

Programmatic Recommendations

The programmatic implications of this study are as follows:

- Mothers often use a trial-and-error approach to weaning. Health interventions should discourage mothers from trial weaning attempts, as these may result in premature weaning of passive children.
- Mothers should be encouraged to relactate a prematurely weaned infant.
- Messages (such as "only breastfeed for six months") can be misunderstood ("breastfeed only for six months"). The promotion of optimal breastfeeding practices must include information about the timing of introduction of complementary foods as well as messages about the importance of continued breastfeeding.
- An important factor in feeding decisions is a mother's own health. To be successful, promotion of breastfeeding must include the promotion of women's health.

A working paper, entitled "Extended Breastfeeding and Malnutrition: An Example of Reverse Causality," is available through Wellstart International.

Infant Feeding Practices in Barbados: The Effects of Physical Growth, Home Environment, and Maternal Depression

Janina R. Galler, Rechele Brooks, Robert Harrison, and Frank Ramsey
Boston University School of Medicine, Boston, MA
July 1996

Background

Breastfeeding has been shown to influence infant growth at least in the first six months, although advantages in cognitive development have been more difficult to identify. Nevertheless, it has been widely recognized that there has been a decline in breast feeding in developing countries as socioeconomic levels rise. The general pattern in these countries is that breast feeding lasts longer (1) in rural areas than urban areas; (2) among women of lower socioeconomic levels than among those of higher socioeconomic levels; and, (3) among women who introduce bottle feeding after approximately three months postpartum. The reasons for the decline in breastfeeding are not well understood and recent studies in Western countries suggest that the role of psychosocial variables, such as maternal depression and other maternal and infant factors, should be assessed.

Studies of infant feeding practices have often been contradictory and difficult to interpret for several reasons. First, cross-cultural practices vary greatly, such that generalizations cannot be made especially from developed to developing countries. Second, despite the recognition that a consistent terminology across studies would make studies across different populations more interpretable, this has often not been practiced. The use of categorical descriptions, such as predominant or partial breastfeeding, to predict infant outcomes has been misleading . Moreover, conclusions based on such categories ignore the variations in infant feeding practices that are present in most families, and changes from one time period to another. Third, the disadvantages of bottle-feeding have been difficult to isolate from poor environmental conditions, over-dilution, and infection, which may also be more common in populations where breastfeeding is abandoned early. This is especially true in developing countries where malnutrition and poverty are prevalent.

These issues were addressed in our study of psychosocial variables affecting feeding practices and infant outcomes in Barbados. In the current study, we followed 226 healthy infants born at the Queen Elizabeth Hospital, Bridgetown, and their mothers from birth to six months and documented patterns of infant feeding

practices at seven weeks, three months, and six months of age, using a range of variables to describe feeding practices and infant outcomes. Sophisticated statistical approaches were used, including factor and multivariate analyses of the longitudinal data set, which allowed us to examine the possibility of a reciprocal relationship between feeding practice factors and infant growth. In a theoretical paper describing mother-infant interaction and infant nutrition, we predicted that variations in infant feeding practices would affect infant growth in a reciprocal fashion. The present study is important because of the lack of extreme poverty or nutritional deficiency and the better standards of health and education in Barbados, as compared with other developing regions of the world. Thus, confounding effects of infection or diarrheal disease were not present.

The study was conducted in 1986, in the Caribbean island of Barbados, where the population is homogeneous and generally of low middle class. The study was based at Queen Elizabeth Hospital because 99% of all birth occur there, making these families representative of the population. We had a complete set of infant outcome data for 101 mother-infant pairs through the six-month period. Infant anthropometry and maternal anthropometry were both measured. Three major questionnaires were used: a Feeding Practices interview, a Home Enviroment interview, and Zung Depression and Anxiety scales, which are summarized below.

Infant Feeding Practices and Their Relationship to Infant Physical Growth

All mothers initiated some breastfeeding. Maternal reports of breastfeeding frequency were included in the factor analysis of feeding practices, which groups related items from the questionnaire in order to reduce the number of domains being studied. The analysis of the Feeding Practices Interview for those 112 mothers who attended all three visits yielded five independent groups of items (factors). Three factors, including the ***Preference for Breastfeeding***, ***Feeding Intensity, and Feeding Difficulty***, all declined with infant age; the two remaining factors, the extent to which ***Father and Relatives Help***, increased with infant age.

Infants' weights and lengths were well within or exceeded the National Center for Health Statistics reference values, showing that the Barbadian infants were not malnourished. At all ages studied, infant weights and lengths were closely related to the feeding factors. Of the five feeding factors identified, the ***Preference for Breastfeeding*** and infant ***Feeding Intensity*** were most closely associated with infant growth in the first six months of life. Mothers with a higher frequency and greater preference for breastfeeding had longer infants at six months. In addition, infants who weighed more were more likely to be rated as feeding intensely at later ages. Thus, the relationship between infant size and feeding practices was bidirectional, each affecting the other at later ages.

The Role of the Home Environment on Feeding and Infant Growth

Next, we measured the role of the socioeconomic conditions and other conditions in the infant's home environment to determine whether these have an effect of infant feeding practices and infant outcomes. The home environments of women in this study were comparable to those of the general Barbadian population. Factor analysis, which groups related items, resulted in nine different factors. These were strongly associated with infant feeding practices, especially ***Household Composition***, ***Health of the Mother***, and ***Maternal Literacy***. However, the significant longitudinal relationships between feeding practices and infant growth described in the previous section were mostly retained, even after controlling for home environment. There are several alternative explanations. First, excellent health and educational programs in Barbados may protect infants from adverse home environmental conditions. This is a likely explanation since we found that maternal size *was* affected by adverse home environment conditions, whereas infant size was not affected. Second, home environment factors may affect infant growth indirectly by modifying feeding practices early on. Once established, the feeding practices are the determining variable, but not the home environment.

The Role of Maternal Depression and Anxiety

The ***Zung Scales***, administered at seven weeks and six months postpartum, measured the role of maternal depression and anxiety in our population. Cases of moderate to severe depression were few. However, the prevalence of mild depression in this population was 16-19%,which was comparable to figures reported in developed countries. Disadvantaged home environments, including lower literacy levels, less family income and poor maternal health, were associated with higher depression and anxiety scores in the women. Again, this pattern was similar to that seen in developed countries.

An important finding in this study was the striking relationship between feeding practices and depressed mood. Thus, higher depression scores at seven weeks postpartum were associated with less ***Preference for Breastfeeding*** and increased infant ***Feeding Intensity*** at later ages. These results remained even when the effects of the home environment were controlled, and have important implications for public policy. Maternal mood also interacted with feeding practices. Specifically, babies who slept with their depressed mothers did not grow as well as babies who did not. However, maternal mood was not independently related with infant growth. We are currently in the process of analyzing other infant outcomes, including developmental quotients and temperament, which may be more sensitive to maternal mood than physical growth.

Implications for Policy, Programs, and Further Research

This study has important policy implications in supporting intervention programs to encourage mothers to increase the frequency and duration of breastfeeding. The clear advantages of breastfeeding in a large, randomly selected population with general good health should be convincing to policy makers in developing countries.

The health care system in Barbados is extremely comprehensive, especially for children less than five years of age, who are required to have regular medical visits to qualify for school entry. We showed that breastfeeding was beneficial in both advantaged and disadvantaged home environments. Programs supporting breastfeeding should therefore be closely linked with health programs supporting the general well-being of the infant.

Finally, intervention programs dealing with mothers and young infants should also take into account the mood of the mother. Depression, even very mild cases, may intefere with a mothers ability to breastfeed and may interact with feeding practices to influence infant outcome. Otherwise successful programs may not have the expected impact if maternal depression is not considered.

This study was partly funded by grants from the Pan American Health Organization and UNICEF (FR). The study was undertaken with the cooperation of the Ministry of Health, Barbados.

Full studies, entitled "Infant Feeding Practices in Barbados: I. Effects of Physical Growth," "Infant Feeding Practices in Barbados: II. The Role of the Home Environment," and "Infant Feeding Practices in Barbados: III. The Role of Maternal Depression and Anxiety" have been submitted for publication to scientific journals by the authors, are presently being reviewed, and are available through Wellstart International.

Breastfeeding and Maternal Employment in Rural Mexico: Voices from the Field

Sara Elena Perez-Gil R.
Instituto Nacional de la Nutricion Salvador Zubiran, Mexico City, Mexico
June 1996

The relationship among breastfeeding, maternal work, and child care was studied in two rural areas: Malinalco, mestizo, near Mexico City in the state of Mexico; and the sister villages of Yatuni and Yahuio, indigenous (Zapotec Indian), in the state of Oaxaca. Following prior exploratory studies in these two areas, the current study was designed to investigate in depth the complexities of the relationship between maternal employment and breastfeeding, through qualitative individual interviews over the course of nine months with the same women.

Research Methods

Participants were recruited for the study through traditional birth attendants who identified women in their last trimester of pregnancy or who had given birth within two months prior to the beginning of the study. In all, ten women were selected from each area. The average number of interviews was eight per woman, or approximately, one per month.

The interview guide covered the following topics: identifying data, family composition, quality of family life including socio-economic conditions, family history, socio-demographic characteristics including work done by family members, maternal work, domestic arrangements, family health and mortality, feeding, breastfeeding, last child, mother's health, motherhood, and the condition of women. The guide was used to ensure the inclusion of the same type of information for every woman, but was not necessarily used in the same order. Interviews were taped and/or notes were taken, then transcribed and edited. Analysis and presentation of data includes quantitative information where that is possible, as well as a range of the qualitative responses and stories the women shared with the investigators.

Population Studied

The average age of the women from Malinalco was 26, and in Oaxaca 30. Those in Oaxaca were higher parity, had experienced more infant deaths, and were generally

of a lower socio-economic level. There were no practices or special knowledge which could be characterized as particular to the group in either group of women. Families, especially spouses, mothers in-law, and mothers, are a woman's partners in pregnancy and childbirth. While the women from Oaxaca tended to use traditional birth attendants, those from Malinalco used physicians' services as well and seemingly interchangeably. Almost all the women in Malinalco delivered at home.

Breastfeeding Patterns

The mothers and mothers in-law of the women all had breastfed all of their children, and considered mother's milk the best food for their newborns. Those in Oaxaca, nevertheless, mentioned they would buy powdered milk for their babies if they could afford it. Colostrum was identified as being good for babies.

In Mexico, insufficient milk syndrome is common as a reason women give for not continuing exclusive breastfeeding. In Malinalco, women believe milk can "go away" because of a fright (*susto*) or anger (*coraje*) on the part of the mother. In Oaxaca, the reason given for this was heavy work. The remedy in Oaxaca consisted of breast massage if the milk is not good, and a steam bath in an earthen "temazcal" if the milk is going away. In Malinalco, remedies included drinks with some alcohol content (pulque). Women in Oaxaca thought wet-nurses were appropriate if needed, while in Malinalco this was not seen as a good idea because babies can become attached to the nurse rather than their mothers. For the women of both communities, their mothers in-law, mothers, and sisters were their primary sonsultants about infant feeding. Physicians took second place.

Breastfeeding and Maternal Employment

The question of employment and breastfeeding for the women of Malinalco who tend to work inside their own home (primarily making tortillas or other food to sell), yeilds the notion that work may not be compatible with breastfeeding. One woman described how if you make tortillas in your home you pass the heat on to the baby and that gives it diarrhea, so it is better to stop breastfeeding, or stop working. Several women had worked previous to their pregnancy, but planned to resume work only when their babies were older. In Oaxaca, some of the women in Yahuio weave rope slings (mecapales) for carrying heavy burdens on the back. All of the women gather wood and most take food to their men in the fields. Most women worked up to the day they gave birth, and resumed work twenty days later. In Yatuni, women stayed in bed

for three days after giving birth. Most women expressed some idea that working too soon would affect the milk coming in. Once they went back to work, women in Oaxaca preferred to have their children with them at all times. In Malinalco, family members helped care for other children or with the housework.

Weaning times were highly varied in both communities, following no particular pattern, ranging from two to eight months in Malinalco, and averaging four to five months in Oaxaca. Type of breastfeeding did not follow a pattern. Weaning foods included: fruits, juices, clear soups, tortilla (dipped in coffee), beans, and pastas. There were women who breastfed exclusively from birth, and women who bottle-fed from birth, as well as mixed patterns. The women in both communities avoided foods considered "cold" (those literally cold as well as vegetables and beans) as harmful to milk production. Warm foods were considered helpful to milk production. All of the women who breastfed said it was a great experience and recommended it to other mothers.

Programmatic Implications

The key programmatic implication of this research is that cultural beliefs must be addressed in the context of exclusive breastfeeding promotion among working women. Specific messages should address the issue of the compatibility of work and breastfeeding, and the quality of breastmilk of working women.

A working paper, entitled "Breastfeeding and Maternal Employment in Rural Mexico: Voices from the Field," is available ***in Spanish only*** *through Wellstart International.*

Infant Food Marketing and its Effect on the Incidence of Diarrhea in the Philippines

John F. Stewart and David K. Guilkey
University of North Carolina, Chapel Hill, NC
January 1996

Background

The observed decline in the prevalence and duration of breastfeeding in less developed countries and the accompanying increase in bottle feeding and early supplementation is a source of concern for professionals in the health and development fields and for policy makers. A focal point for this concern is the aggressive marketing of infant formula and other commercial feeding products to mothers in developing countries that began in the 1970s. The primary concern is for the health and welfare of the infants. The full or partial substitution of commercial feeding product for breastmilk could adversely affect an infants' health in several ways.

Except in extreme cases of mothers' malnutrition or ill health, breastfeeding provides proper nutrition and breastmilk is available in nutritionally adequate amounts at low direct cost. Commercial products are relatively expensive compared with typical incomes in less developed countries and the expense of formula may cause mothers to feed formula in nutritionally insufficient amounts or to substitute cheaper but nutritionally inferior commercial feeding products. Malnutrition may be the result. Further, commercial products require clean water sources and good hygiene practices if the risk of diarrheal disease is to be minimized. Though a considerable literature exists on the relationship between infant feeding practices and infant health and some work has been done analyzing the effect of infant food marketing activities on mothers' feeding choices, very little has been done to trace the links from marketing to ultimate health concerns.

Methods

Using a panel data set covering some nearly 2900 infants born between May 1, 1983 and April 30, 1984 in the Cebu region of the Philippines, mothers' feeding decisions and infantile diarrheal morbidity rates are modeled and jointly estimated to determine the significance of feeding patterns and the underlying determinants of feeding patterns on diarrheal morbidity.

Results

The data clearly support the hypothesis that infant feeding practices are important proximate determinants of diarrheal morbidity and that breastfeeding, both exclusively and in combination with supplementation, reduces the incidence of diarrhea. Simulated diarrheal morbidity rates for exclusive formula feeding are estimated to be roughly 1.8 times higher than the corresponding rates for exclusive breastfeeding.

Infant food marketing activities, including the distribution of samples of formula and media advertising of infant feeding products, are found to alter feeding choice. The changes in feeding patterns are as expected. Mothers exposed to the various marketing activities tend to shift away from exclusive breastfeeding and mixed feeding toward the use of breastmilk substitutes in both exclusive and mixed feeding patterns.

Even though the observed marketing behavior does cause some shifting from lower risk feeding behavior to higher risk feeding behavior, the marketing induced changes in feeding behavior are not sufficiently large to produce major aggregate changes in diarrheal morbidity rates. This finding may be partially a result of the timing of our study, in that marketing activities were not as pervasive as they probably had been earlier because of limited voluntary compliance with the World Health Organization (WHO) Code. It is also partially the result of the fact that some of the marketing-induced change in feeding patterns is between various mixed feeding patterns that involve roughly equal risk of diarrheal morbidity. Also the presence of effects of poor water supplies and other inadequate sanitation facilities and practices (a major underlying source of infantile diarrhea in the Cebu sample) tended to discourage high risk feeding patterns.

A working paper, entitled "Infant Food Marketing and its Effect on the Incidence of Diarrhea in the Philippines," is available through Wellstart International.

What constitutes the optimal length of exclusive breastfeeding during infancy?

Optimal Duration of Exclusive Breastfeeding of Low Birthweight Infants in Honduras

Kathryn Dewey, Roberta Cohen, Kenneth Brown, and Leonardo Lamda
University of California, Davis, CA
July 1996

Background and Objectives

Current evidence indicates that exclusive breastfeeding until about six months of age can be recommended for full-term, normal birthweight infants, but it is unclear whether this recommendation can also be applied to low birthweight (LBW) infants. LBW infants represent up to 50% of births in some developing countries. Because infant sucking ability is related to birthweight, mothers of these infants may have more difficulty establishing lactation. LBW infants are also more vulnerable to nutritional deficiencies because they are more likely to be born to malnourished mothers and to have lower stores of several key nutrients at birth. They may also be more vulnerable to dehydration, due to limited renal function. At present there are no reference data for growth of LBW, breastfed infants, which makes it difficult to evaluate the adequacy of breastfeeding in this group.

This study was designed to address the following specific questions with respect to term, LBW infants in Honduras:

1) What is the incidence of inadequate breastmilk intake among LBW infants whose mothers are provided with intensive lactation guidance, and what are the risk factors for this?

2) What is the pattern of growth among exclusively breastfed, LBW infants, and does this vary between those born to mothers of low versus normal body mass index?

3) Do exclusively breastfed, LBW infants need extra water?

4) What is the risk of micronutrient deficiencies among exclusively breastfed, LBW infants?

5) What are the barriers to exclusive breastfeeding in this population?

6) Do exclusively breastfed, LBW infants need complementary food prior to six months?

Study Design

The study was designed as a prospective observational study from birth to four months of age, followed by a randomized intervention trial of complementary feeding from four to six months. Mothers of full-term (≥ 37 week) infants weighing 1500-2500 grams at birth, who were willing to exclusively breastfeed for at least four months, were recruited from the two main maternity hospitals in San Pedro Sula, Honduras. Lactation guidance was provided to all subjects in the hospital and at home visits at three days postpartum and every week thereafter. Anthropometric and morbidity data were collected each week. Blood samples were collected at two, four, and six months of age. At sixteen weeks of age, infants were randomly assigned to one of two groups: 1) continued exclusive breastfeeding to six months, or 2) complementary feeding plus breastfeeding from four to six months, with mothers requested to maintain baseline nursing frequency. The complementary foods were provided in jars (Beech Nut) and included rice cereal, chicken, fruits and vegetables.

Preliminary Findings

The following are highlights of the preliminary results from this project:

1) Adequacy of Lactation

The adequacy of lactation was assessed by weighing all infants weekly during the first four months. When weight gain was low in a given week, the field workers assessed the situation and provided some advice to the mother. An infant was considered to have "inadequate weight gain" if there were *two consecutive weeks* of low gain. In these cases, the mother and infant were either brought into the central facility for further assessment, or a lactation consultant went to the home to conduct an assessment.

In total, 65 cases (40%) met the criteria for "inadequate weight gain" at some point during the first sixteen weeks postpartum, using cut-offs that approximated the tenth percentile for growth velocity. Of these, supplementary feeds were considered necessary for seven infants (in three of these, the "supplement" given was the mother's breastmilk by syringe or spoon). Two required temporary feeding by nasogastric tube. Of the seven cases, all but two were able to discontinue the supplement after one to two weeks. There are no normative data available to indicate what the expected percentage would be in a more affluent population, but given the typically large within-individual variability in infant growth, it is likely to be considerably greater than 10%. In this sample, the percentage identified with inadequate weight gain did not change with age in a consistent pattern. However, certain problems were

more likely to be evident during the first few weeks, such as poor infant suck, infant sleeping too much, and poor breastfeeding technique. Inadequate weight gain was more often linked to infant factors, particularly illness, than to maternal factors. After receiving lactation guidance, the vast majority of the cases did not continue to exhibit inadequate growth. Supplementation was rarely considered necessary, even temporarily.

2) Infant Growth

A. First Month

Infant weight gain during each of several intervals (0-7 days, 0-14 days, and 0-30 days) was examined as a proxy for adequacy of breastmilk intake during the establishment of breastfeeding. More than 30 different variables that might influence this process were examined using multiple regression. These were grouped into five categories: a) infant characteristics (anthropometric indices, gestational age, sex, Apgar score); b) maternal characteristics (age, parity, birth spacing, marital status, education, anthropometric indices, and several indicators of socioeconomic status); c) early feeding practices (use of a bottle in the hospital, use of a "chupon," timing of the first breastfeed); d) aspects of labor, delivery and the early postnatal period (vaginal versus cesarean section, complications for either mother or infant, length and difficulty of labor, breast pain, cracked nipples); and, e) variables reflecting maternal attitudes and motivation (number of visits for prenatal care, confidence in breastfeeding, anxiety level).

Of these variables, several consistent associations were observed. In the first two weeks, infant weight gain was positively associated with gestational age, Apgar score, head circumference, and number of prenatal visits and negatively associated with ponderal index (wt/length^3), use of a bottle in the hospital, length of labor, parity, and use of a chupon. Infant sex became an important predictor of weight gain after the first two weeks. Several variables were not related to infant weight gain, including maternal anthropometric indices, education and marital status.

These results indicate that the risk factors for lower weight gain in the first month include the following: infant immaturity; infant health status at birth (Apgar score); high ponderal index at birth; lack of prenatal care; use of bottles or chupones; long labor; and, other children to care for.

B. Birth to Four Months

The LBW cohort showed considerable "catch-up" by four months, with the average z-score increasing from -2.04 to -0.45. However, absolute weight gain from birth to

four months was significantly lower in the LBW infants compared to data from normal weight infants available from an earlier study. The average length-for-age z-score of the LBW cohort increased from -1.95 to -1.01 from birth to four months.

The average BMI of the mothers was 23.7 kg/m^2; only fifteen had a BMI considered "low" (< 20). Weight gain of infants born to these low BMI mothers was significantly lower from zero to four months than that of infants born to normal BMI mothers. The difference in length gain zero to four months was not significant.

3) Hydration Status

Urine specific gravity was measured as an indicator of hydration status of male infants at two weeks (N=68) and eight weeks (N=59) of age. Subjects stayed at the central facility for eight hours, during which time two to twelve urine samples were collected per infant. The range in temperature was 72-96° F, and the range in relative humidity was 37-86%. None of these infants had an abnormal level (> 1.02) indicative of an attempt to conserve water. The only case of dehydration seen during the study was an infant brought in for assessment of inadequate weight gain in the first two weeks postpartum, whose mother had very low milk production.

These results indicate that even among low birthweight infants in a hot, humid climate, breastmilk alone is sufficient to assure adequate hydration status.

4) Anemia

Blood samples were collected at two, four, and six months. At two months, 47.5% had a hemoglobin (Hb) concentration < 10 g/dL and were given iron supplements. At four months, another eight infants had a Hb < 10, and eleven of 58 infants who had received iron supplements at two months still had a Hb < 10. Slightly less than half (49%) of the infants did not have a low Hb level at either two or four months, and 35% never had a low Hb level during the first six months.

Results from retesting of those infants who received iron supplements suggests that iron deficiency was a factor underlying low Hb levels in the majority of cases. Small infant size was the main predictor of low Hb at two months.

Plasma ferritin was measured, as this index is generally considered to be reflective of iron stores. The results indicated no correlation between ferritin concentration and either Hb or hematocrit. Thus, ferritin concentration does not appear to be a good

index of iron status during the first six months of life. Data on other indicators of iron status (% transferrin saturation) are still pending.

These results confirm previous observations that low birthweight, exclusively breastfed infants are at high risk for iron deficiency within the first six months of life. Current recommendations are to provide iron drops routinely to all such infants at about two to three months.

Analyses of other indices of micronutrient status are pending.

5) Barriers to Exclusive Breastfeeding

In general, there was strong support for exclusive breastfeeding from husbands, but less support from the mother's parents, in-laws, friends, and neighbors. At two, four, eight, and twelve weeks postpartum, mothers were asked if anyone advised them to give the child other fluids or foods. The percentage responding "yes" was 23%, 19%, 21% and 11%, respectively. In the first month, such advice came from many sources (family, neighbors, husband, friends), but at eight and twelve weeks such advice was most likely to come from neighbors. The percentage of mothers who were confident in their ability/desire to exclusively breastfeed until six months increased from 87% at two weeks to 96-97% at eight to twelve weeks.

These findings indicate that the whole community must be targeted in educational campaigns to increase the duration of exclusive breastfeeding. The most vulnerable period is the first few weeks postpartum. After that, mothers'confidence in their ability to exclusively breastfeed increases, although they still face pressure from others to give their children other foods or fluids.

6) Response to Complementary Foods from Four to Six Months

There was no significant difference in weight or length gain from four to six months between exclusively breastfed infants and those who were given complementary foods. As was found in our previous study, breastmilk intake declined between four and six months in those given complementary foods but increased slightly in those exclusively breastfed. These results suggest that with regard to infant growth, the recommendation to breastfeed exclusively to about six months can also be applied to LBW infants.

Programmatic Implications

- The recommendation to breastfeed exclusively to about six months can also be applied to LBW infants.
- Supplemental water is not needed even among low birthweight infants in a hot, humid climate.
- Low birthweight, exclusively breastfed infants are at high risk for iron deficiency within the first six months of life and should be routinely provided with iron drops at about two to three months.
- Mothers of LBW infants may require targetting for lactation guidance
- Use of bottles in the hospital was significantly associated with low weight gain in the first two weeks and should be avoided, unless absolutely medically indicated.
- The most vulnerable period for failure to exclusively breastfeed is the first few weeks postpartum.

A working paper, entitled "Optimal Duration of Exclusive Breastfeeding on Low Birthweight Infants in Honduras," is available through Wellstart International.

Special Polices are Needed to Promote Breastfeeding Among Low Birthweight Infants

Linda S. Adair and Barry M. Popkin
University of North Carolina, Chapel Hill, NC
September 1995

Low birthweight (LBW) continues to be a major concern in developing countries, where, on average, 19% of infants are born weighing less than 2500g. LBW infants suffer higher rates of morbidity and mortality, and many continue to be growth-retarded throughout childhood. Given the known nutritional and health-promoting effects of human milk, promotion of breastfeeding is of particular importance for these vulnerable infants.

Very little is known about how LBW infants in developing countries are fed. The few available research reports suggest that LBW infants are less likely to be breastfed at all or are breastfed for shorter periods of time. This situation may occur if LBW is associated with feeding problems related to poorly developed sucking reflexes or other health problems of the infant at birth, or because mothers' perceptions of the size and capabilities of their infants affect their feeding decisions. LBW infants born in hospitals may be subject to policies which single them out for special care. In these instances, mothers and infants may be separated for prolonged periods of time. This delayed contact may impair or prevent the establishment of breastfeeding. Thus, different patterns of feeding LBW infants may be established based on the place of delivery.

Methods

To understand how LBW influences infant feeding, its effects must be isolated from other factors that affect feeding. Therefore, this assessment of LBW included controls for maternal age, parity, education, socioeconomic status, place of delivery, receipt of free infant formula sample, place of residence, and the infant's sex and gestational age. Nearly 3,000 infants from Cebu, the second largest city in the Philippines were studied. The infants were part of a longitudinal community-based health and nutrition survey conducted from 1983-1986 by researchers from the University of North Carolina at Chapel Hill, and the University of San Carlos in Cebu. Data were collected by interviewing mothers during pregnancy, immediately after birth, and every two months thereafter for a period of two years. Information on

health facilities was gathered during surveys of hospital and clinic personnel. Infants were weighed at birth and within six days of birth. Gestational age was determined from the date of the mother's last menstrual period for the majority of infants, but in the case of LBW infants or those whose mothers had pregnancy complications, the Ballard method was used to assess gestational age clinically within 120 hours of birth. LBW occurred in 11.5% of the infants in the study. About 28% of LBW infants were born preterm (fewer than 37 weeks gestation).

Three different feeding outcomes were examined:

1. ***Concordance of breastfeeding intentions and practices***

One way to understand how biological and other factors in the perinatal period affect feeding behaviors is to explore the role of breastfeeding intentions and their concordance with actual feeding practices.

During the baseline survey, mothers were asked how they planned to feed their infant. Their intentions were compared to actual feeding practices and four groups were defined:

a. Intended to breastfeed and did breastfeed, n = 2498 (84.5%)
b. Intended to breastfeed but did not breast-feed, n = 85 (2.9%)
c. Did not intend to breastfeed but did breastfeed, n = 260 (8.8%)
d. Did not intend to breastfeed and did not breastfeed, n = 112 (3.8%)

Of particular interest is the second group, since condition of the infant at birth or other barriers to breastfeeding encountered at delivery may have caused the mother to change her mind about the feeding method.

2. ***Initiation of breastfeeding***

A categorical variable indicates whether or not the mother ever initiated breastfeeding, either in the first several days after birth or subsequently. Earlier studies of the Cebu sample showed that women may discard colostrum and not initiate breastfeeding for several days. Only 6.75% of mothers in this sample never initiated breastfeeding.

3. ***Patterns of feeding in the first six months of life***

Infants were classified into four groups based on overall feeding patterns during the first six months.

a. Fully breastfed for at least six months, n = 388 (14.1%)
b. Fully breastfed for more than two but fewer than six months, then mixed fed, n = 1321 (47.9%)
c. Mixed fed throughout, n = 307 (11.1%)
d. Not breastfed or weaned early, n = 741 (26.9%)

Infants were considered fully breastfed if, based on a 24-hour food recall, they received fewer than 20 kilocalories from supplemental foods. In most cases, such infants were receiving "tastes" of weaning foods or sweetened liquids such as herbal teas. Infants were considered to have been weaned early if they initiated breastfeeding, but were totally weaned from the breast before six months of age. Infants were considered not breastfed if they never initiated breastfeeding.

An analysis method was used that allows estimation of how each independent variable (e.g., LBW, infant's sex, all of the other confounders listed above) affects the likelihood of a particular outcome (e.g., never being breastfed or being fully breastfed for six months). Results are expressed as relative risk ratios (RRR) with corresponding 95% confidence intervals (CI). To assist in the interpretation of results, the effects of specified conditions were simulated, principally LBW versus normal birth weight and place of delivery.

Feeding practices differed considerably by place of delivery, because some of the same factors that influenced women's choice of feeding method also influenced her choice of where to deliver. Thus, women with more income and education were more likely to deliver in private hospitals, less likely to have LBW infants, and less likely to breastfeed. Breastfeeding prevalence was highest among women who delivered at home. Therefore place of delivery was taken into account in all of the analyses. About 18% of the infants in the study were born in public hospitals, 21% were born in private hospitals, and the remaining 61% were born at home.

Within a facility category (public, private, home), there was a consistent trend of lower percentages of LBW compared to normal weight infants initiating breastfeeding, or of continuing to breastfeed at two, four, and six months. This trend was most marked among infants born in public facilities. However, within each place of delivery, there was also a trend toward increased prevalence of *full breastfeeding* in LBW infants at all ages. That is, when LBW infants were breastfed, they were more likely to be fully breastfed. These results were confirmed by the multivariate analysis.

Breastfeeding Intentions Versus Practices

LBW more than tripled the likelihood of not breastfeeding among women who intended to do so (RRR = 3.13). This effect of LBW is slightly stronger for LBW-preterm (RRR = 3.37) than for LBW-term infants (RRR = 2.86). Other factors that were significantly related to mothers not following through with their intention to breastfeed included delivery in a private hospital, being given a free sample of infant formula after delivery, and being a first-time mother. We also found a significant negative effect on breastfeeding of the mother's perception that her infant was small, suggesting independent effects of infant biology and mothers' perceptions.

Initiation of Breastfeeding

LBW infants were 40% less likely ever to be breastfed compared to normal weight infants. This effect was stronger for term-LBW than for preterm-LBW infants. Delivery in a private health facility, older maternal age, higher levels of maternal education, higher household income and assets, and delayed first contact between mother and infant after birth also significantly decreased the likelihood of ever breastfeeding.

Infant Feeding Patterns in the First Six Months

In the analysis of factors related to feeding groups, the chances of following one feeding pattern were compared with the chances of following each other feeding pattern. LBW: (1) more than doubled the likelihood of not breastfeeding or of early weaning compared to mixed feeding for six months (RRR = 2.22); (2) increased by nearly 50% the likelihood of not breastfeeding or early weaning compared to full breastfeeding for at least two but less than six months (RRR = 1.49); and, (3) doubled the likelihood of full breastfeeding for six months compared to mixed feeding for six months (RRR = 2.02). In all delivery settings, the probability of never breastfeeding or weaning early was higher in LBW compared to normal weight infants. The multivariate analyses also confirmed that LBW infants who are breastfed are more likely to be fully breastfed.

Conclusions

In summary, LBW strongly and consistently affected infant feeding practices. Giving birth to a LBW infant was a deterrent to breastfeeding. Place of delivery was particularly important: LBW had a larger impact on feeding decisions of mothers who deliver away from home in private or public health facilities. However, in cases

where mothers still elected to breastfeed, LBW status increased the likelihood that mothers would fully breastfeed their infant. LBW infants tend to undergo a period of catch-up growth in the first two months of life, particularly if they are fully breastfed and thus well-nourished and more protected from infectious diseases. In this population, fully breastfed infants weighed more in the first four months of life as compared to infants with other feeding patterns. The good growth performance of fully breastfed infants may serve to reinforce the mother's breastfeeding behavior.

The research findings should have important health implications for infants born in less developed countries. A lower incidence of breastfeeding among LBW infants is an unfortunate consequence because of the greater health risks they face. The health risks are related in part to biological characteristics of the LBW infant, but also to poor environmental conditions that contribute to LBW and poor postnatal outcomes. Given the proven nutritional and immunological superiority of breastmilk, breastfeeding is of special importance to the LBW infant, or as Indian physician Narayanan has stated, breastmilk is a "passport to life."

Program and Policy Implications

- Efforts must be made to single out and eliminate policies that hinder the establishment of breastfeeding in clinical settings. Such policies would benefit all infants, regardless of birth weight status.

- Special policies are needed to promote breastfeeding of LBW infants.

- Enhanced education and encouragement of mothers of LBW infants is needed to address their concerns about the infant's size and capabilities, as well as their special needs.

A working paper, entitled "Special Policies are Needed to Promote Breastfeeding Among Low Birthweight Infants," is available through Wellstart International.

Patterns and Determinants of Maternal Nutritional Status During Lactation in Malawi

Jay Ross and Jean-Pierre Habicht
Cornell University, Ithaca, NY
January 1996

Background

Exclusive breastfeeding is unquestionably good for infant health. It delivers the right balance of nutrients needed for growth and protects the infant from an infectious environment. The hormonal effects of breastfeeding delay ovulation and the next conception, a benefit that the entire family shares. However, the energy cost to the mother is large—equivalent to about an extra meal (700 kilocalories) per day. Under conditions of poverty and food scarcity, this high energy cost of lactation could lead to depletion of the mother's energy reserves, endangering her health and therefore the health of her dependent infant.

Under such circumstances, successful promotion of exclusive breastfeeding may require additional complementary efforts to provide nutritional and other support to the mother. Even when infant health is not jeopardized, the possible threat to maternal health should be of concern in breastfeeding promotion. To design adequate complementary support programs (including nutritional, income, or other support), there is a need to identify the conditions under which such support is necessary, the causal factors responsible, and the women most likely to be affected.

The research described here addresses these needs through three analytical strategies: a) description of changes in body measurements during pregnancy and lactation; b) statistical analysis of the relationships between lactation and changes in maternal weight; and, c) development of a screening tool to predict maternal malnutrition one year after delivery.

Participating in this study were 923 women in rural agricultural communities in Northern Malawi who were visited monthly from pregnancy through the first twelve months after delivery. At each visit measurements were made of the mother's weight, arm circumference, and subcutaneous fat at two body sites. Information was also obtained on infant feeding methods, infant body weight, and a range of individual and household characteristics.

Patterns of Maternal Nutritional Status During Pregnancy and Lactation

Patterns of change observed in maternal body measurements (weight, arm circumference, triceps and subscapular skinfold thicknesses, arm fat area, and arm muscle area) during pregnancy and lactation were plotted graphically. These descriptive analyses revealed that, on average, mothers lost fat during pregnancy and regained it during lactation. This is contrary to expectation based upon the higher theoretical energy demands of lactation relative to pregnancy. Average weight gain during pregnancy was 6.1 kg—only half of the amount recommended to minimize the risk of a poor outcome. Low weight gain and high fat loss during pregnancy was associated with low infant birth weight in this population.

Season was a strong determinant of the pattern of weight and fat change. Average seasonal oscillations of about two kilograms were observed in maternal weight during lactation. The lowest weights were observed in February at the end of the period of lowest food availability. Peak weights were observed during the post-harvest season from June to September.

Determinants of Maternal Nutritional Status During Lactation

Although the patterns of fat loss and gain described above suggested that lactation was not, on average, the time of greatest energy stress, the statistical analysis allowed an investigation of the conditional nature of energy stress at this time. The statistical methods used allowed us to correct for various sources of error and to control for potentially confounding variables that might also account for maternal weight changes, including season of measurement, household income, maternal illness, and time since delivery (infant age). Lacking direct measures of the amount of breastmilk produced, the rate of growth of the infant was used as a proxy for energy consumption and the frequency of feeding of non-breastmilk foods as a proxy for the proportion of that energy not coming from breastmilk.

Measured in this way, lactation had a negative impact on maternal weight but this effect was observed only when the breastfeeding infant was gaining weight normally and when the mother had a low arm circumference near delivery. At high levels of initial maternal arm circumference or at low rates of infant growth, the effect of full lactation was minimal. A mother with an arm circumference of 22.2 cm (10th percentile in this population) and with an infant growing at the median rate for healthy three-month old breastfed American infants, would be 0.97 kg lighter, on average, if she was fully lactating rather than feeding her infant non-breastmilk foods at a rate of four foods per day.

These results make intuitive sense: the fastest growing infants have the greatest impact on the energy reserves of their mothers and those mothers with marginal nutritional status at the outset are less able to protect themselves from this process. Other research in Pakistan had indicated that malnourished mothers may be protected against further losses during lactation but the mothers in our sample were better nourished than the Pakistani women and were probably above the threshold where such buffering mechanisms operate.

Maternal illness has a negative impact on maternal weight. Season of measurement was also a strong determinant of maternal weight, confirming the results of the descriptive analysis.

A Screening Tool to Identify Mothers at Risk of Energy Depletion

Epidemiological methods (logistic regression and receiver operating characteristics) were used to test the ability of a variety of screening tools to predict maternal malnutrition one year after delivery. Maternal malnutrition was defined as having a body mass index (BMI) less than 18.5 kg/m^2. Using a set of 24 different environmental, maternal and infant variables, and variable combinations measured near delivery, the best predictor of maternal malnutrition was a combination of maternal height, weight, arm circumference, and age. The best single predictor was BMI measured near delivery. None of the infant, household, or community variables substantially improved on the use of maternal anthropometry near delivery to predict energy deficiency.

Maternal arm circumference was nearly as good as BMI in predicting maternal malnutrition, especially at low cut-off levels of the indicator. Considering the difficulty of obtaining weight and height of the mother and calculating BMI in a field setting, arm circumference is therefore recommended as the screening tool of choice in most situations.

Implications for Policy, Programs, and Research

These results have the following important implications for policies to improve maternal and infant nutritional status in similar situations and for future research.

- The promotion of exclusive breastfeeding remains a crucial component of efforts to improve both infant and maternal health. The effect of lactation on maternal energy stores described here suggests that concurrent efforts to improve maternal nutrition would enhance the benefits of breastfeeding promotion.

- These concurrent efforts could include programs that: a) improve women's access to and utilization of food; and, b) reduce the burden of work and illness, not just during lactation, but throughout the life cycle. These concurrent efforts should aim to benefit women with the poorest nutritional status, who are most vulnerable to lactational depletion. Such targeting makes intuitive sense but the present research provides additional justification because these are the women at greatest risk of further weight loss during full lactation, especially when their infants are growing normally.

- Even under conditions of low initial arm circumference and normal infant growth, the potentially depleting effects of lactation should not deter the promotion of exclusive breastfeeding. The health benefits to the mother of the delay in subsequent conception associated with exclusive breastfeeding are at least as important. Also, the high efficiency of conversion of dietary energy into breastmilk make feeding the mother the best strategy for feeding the infant. The alternative to exclusive breastfeeding (preparation and feeding of substitutes) would consume household resources (time, fuel, food and water) that would be better invested in the mother.

- The contribution of maternal illness to weight loss suggests that health interventions should be among the range of interventions considered.

- The strong effects of season on maternal weight change during lactation suggest that efforts to protect maternal nutritional status may be most needed and most effective during the period of most rapid weight loss (September to February in this population). Additional research to determine what seasonal factors are most important would help in identifying the most appropriate seasonal interventions.

- In screening for risk of maternal energy deficiency during lactation, maternal arm circumference is recommended. This is almost as useful as more sophisticated instruments (BMI or multi-variable indices) but is much easier and cheaper to use. Research in conjunction with intervention efforts should be directed at verifying whether maternal arm circumference is as useful in predicting benefit (response to the intervention) as in predicting risk.

A working paper, entitled "Patterns and Determinants of Maternal Nutritional Status During Lactation in Malawi," is available through Wellstart International.

68

WELLSTART INTERNATIONAL

Wellstart International is a private, nonprofit organization dedicated to the promotion of healthy families through the global promotion of breastfeeding. With a tradition of building on existing resources, Wellstart works cooperatively with individuals, institutions, and governments to expand and support the expertise necessary for establishing and sustaining optimal infant feeding practices worldwide.

Wellstart has been involved in numerous global breastfeeding initiatives including the Innocenti Declaration, the World Summit for Children, and the Baby Friendly Hospital Initiative. Programs are carried out both internationally and within the United States.

International Programs

Wellstart's *Lactation Management Education (LME) Program*, funded through USAID/Office of Nutrition, provides comprehensive education, with ongoing material and field support services, to multidisciplinary teams of leading health professionals. With Wellstart's assistance, an extensive network of Associates from more than 40 countries is in turn providing training and support within their own institutions and regions, as well as developing appropriate in-country model teaching, service, and resource centers.

Wellstart's *Expanded Promotion of Breastfeeding (EPB) Program*, funded through USAID/Office of Health, broadens the scope of global breastfeeding promotion by working to overcome barriers to breastfeeding at all levels (policy, institutional, community, and individual). Efforts include assistance with national assessments, policy development, social marketing including the development and testing of communication strategies and materials, and community outreach including primary care training and support group development. Additionally, program-supported research expands biomedical, social, and programmatic knowledge about breastfeeding.

National Programs

Nineteen multidisciplinary teams from across the U.S. have participated in Wellstart's lactation management education programs designed specifically for the needs of domestic participants. In collaboration with universities across the country, Wellstart has developed and field-tested a comprehensive guide for the integration of lactation management education into schools of medicine, nursing and nutrition. With funding through the MCH Bureau of the U.S. Department of Health and Human Services, the NIH, and other agencies, Wellstart also provides workshops, conferences and consultation on programmatic, policy and clinical issues for healthcare professionals from a variety of settings, e.g. Public Health, WIC, Native American. At the San Diego facility, activities also include clinical and educational services for local families.

Wellstart International is a designated World Health Organization Collaborating Center on Breastfeeding Promotion and Protection, with Particular Emphasis on Lactation Management Education.

For information on corporate matters, the LME or National Programs, contact:

Wellstart International Corporate Headquarters
4062 First Avenue
San Diego, California 92103 USA
tel: (619) 295-5192
fax: (619) 294-7787

For information about the EPB Program contact:

Wellstart International
3333 K Street NW, Suite 101
Washington, DC 20007 USA
tel: (202) 298-7979
fax: (202) 298-7988
e-mail: info@dc.wellstart.org